SEQUENCE LISTING

<110> OmniGene BioProducts, Inc. et al.

<120> MICROORGANISMS AND PROCESSES FOR ENHANCED PRODUCTION OF PANTOTHENATE

<130> BGI-154PC

<160> 31

<170> PatentIn Ver. 2.0

<210> 1
<211> 194
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:promoter
     sequence

<220>
<221> -35_signal
<222> (136)..(141)

<220>
<221> -10_signal
<222> (159)..(164)

<400> 1
gctattgacg acagctatgg ttcactgtcc accaaccaaa actgtgctca gtaccgccaa 60
tatttctccc ttgaggggta caaagaggtg tccctagaag agatccacgc tgtgtaaaaa 120
ttttacaaaa aggtattgac tttccctaca gggtgtgtaa taatttaatt acaggcgggg 180
gcaaccccgc ctgt   194

<210> 2
<211> 163
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:promoter
     sequence

<220>
<221> -35_signal
<222> (113)..(118)

<220>
<221> -10_signal
<222> (136)..(141)

<400> 2
gcctacctag cttccaagaa agatatccta acagcacaag agcggaaaga tgttttgttc 60
tacatccaga acaacctctg ctaaaattcc tgaaaaattt tgcaaaaagt tgttgacttt 120

atctacaagg tgtggtataa taatcttaac aacagcagga cgc   163

<210> 3
<211> 127
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:promoter
      sequence

<220>
<221> -35_signal
<222> (34)..(39)

<220>
<221> -10_signal
<222> (58)..(63)

<220>
<221> -35_signal
<222> (75)..(80)

<220>
<221> -10_signal
<222> (98)..(103)

<400> 3
gaggaatcat agaattttgt caaaataatt ttattgacaa cgtcttatta acgttgatat 60
aatttaaatt ttatttgaca aaaatgggct cgtgttgtac aataaatgta gtgaggtgga 120
tgcaatg   127

<210> 4
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:ribosome
      binding site

<400> 4
taaacatgag gaggagaaaa catg   24

<210> 5
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:ribosome
      binding site

<400> 5
attcgagaaa tggagagaat ataatatg   28

<210> 6

<211> 13
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:ribosome
     binding site

<400> 6
agaaaggagg tga   13

<210> 7
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:ribosome
     binding site

<220>
<221> misc_feature
<222> 17, 18, 19, 20
<223> n = a, t, c, or g

<400> 7
ttaagaaagg aggtgannnn atg   23

<210> 8
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:ribosome
     binding site

<220>
<221> misc_feature
<222> 16, 17, 18, 19, 20
<223> n = a, c, t, or g

<400> 8
ttagaaagga ggtgannnnn atg   23

<210> 9
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:ribosome
     binding site

<220>
<221> misc_feature
<222> 14, 15, 16, 17, 18, 19, 20
<223> n = a, c, t, or g

```
<400> 9
agaaaggagg tgannnnnnn atg                                          23

<210> 10
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:ribosome
      binding site

<220>
<221> misc_feature
<222> 14, 15, 16, 17, 18, 19
<223> n = a, c, t, or g

<400> 10
agaaaggagg tgannnnnna tg                                           22

<210> 11
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:ribosome
      binding site

<400> 11
ccctctagaa ggaggagaaa acatg                                        25

<210> 12
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:ribosome
      binding site

<400> 12
ccctctagag gaggagaaaa catg                                         24

<210> 13
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:ribosome
      binding site

<400> 13
ttagaaagga ggatttaaat atg                                          23

<210> 14
<211> 23
<212> DNA
```

```
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:ribosome
      binding site

<400> 14
ttagaaagga ggtttaatta atg                                    23

<210> 15
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:ribosome
      binding site

<400> 15
ttagaaagga ggtgatttaa atg                                    23

<210> 16
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:ribosome
      binding site

<400> 16
ttagaaagga ggtgtttaaa atg                                    23

<210> 17
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:ribosome
      binding site

<400> 17
attcgagaaa ggaggtgaat ataatatg                               28

<210> 18
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:ribosome
      binding site

<400> 18
attcgagaaa ggaggtgaat aataatg                                27

<210> 19
<211> 28
```

<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:ribosome
      binding site

<400> 19
attcgtagaa aggaggtgaa ttaatatg   28

<210> 20
<211> 51
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:5' PCR primer
<223> for serA gene

<400> 20
ccctctagag gaggagaaaa catgtttcga gtattggtct cagacaaaat g   51

<210> 21
<211> 43
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:3' PCR primer
<223> for serA gene

<400> 21
cccggatcca attatggcag atcaatgagc ttcacagaca caa   43

<210> 22
<211> 48
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:5' PCR primer
<223> for glyA gene

<400> 22
ggatctagag gaggtgtaaa catgaaacat ttacctgcgc aagacgaa   48

<210> 23
<211> 43
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:3' PCR primer
<223> for glyA gene

<400> 23
cggggatccc ccatcaacaa ttacacactt ctattgattc tac   43

<210> 24

<211> 7926
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:serA overexpression
<223> plasmid

<400> 24
```
gaattttgcg gccgcttcga aagctgtaat ataaaaacct tcttcaacta acggggcagg 60
ttagtgacat tagaaaaccg actgtaaaaa gtacagtcgg cattatctca tattataaaa 120
gccagtcatt aggcctatct gacaattcct gaatagagtt cataaacaat cctgcatgat 180
aaccatcaca aacagaatga tgtacctgta aagatagcgg taaatatatt gaattacctt 240
tattaatgaa ttttcctgct gtaataatgg gtagaaggta attactatta ttattgatat 300
ttaagttaaa cccagtaaat gaagtccatg gaataataga aagagaaaaa gcattttcag 360
gtataggtgt tttgggaaac aatttccccg aaccattata tttctctaca tcagaaaggt 420
ataaatcata aaactctttg aagtcattct ttacaggagt ccaaatacca gagaatgttt 480
tagatacacc atcaaaaatt gtataaagtg gctctaactt atcccaataa cctaactctc 540
cgtcgctatt gtaaccagtt ctaaaagctg tatttgagtt tatcaccctt gtcactaaga 600
aaataaatgc agggtaaaat ttatatcctt cttgttttat gtttcggtat aaaacactaa 660
tatcaatttc tgtggttata ctaaaagtcg tttgttggtt caaataatga ttaaatatct 720
cttttctctt ccaattgtct aaatcaattt tattaaagtt catttgatat gcctcctaaa 780
tttttatcta aagtgaattt aggaggctta cttgtctgct ttcttcatta gaatcaatcc 840
tttttttaaaa gtcaatatta ctgtaacata aatatatatt ttaaaaatat cccactttat 900
ccaattttcg tttgttgaac taatgggtgc tttagttgaa gaataaagac cacattaaaa 960
aatgtggtct tttgtgtttt tttaaaggat ttgagcgtag cgaaaaatcc ttttctttct 1020
tatcttgata ataagggtaa ctattgaatt cggtaccaag agtttgtaga aacgcaaaaa 1080
ggccatccgt caggatggcc ttctgcttaa tttgatgcct ggcagtttat ggcgggcgtc 1140
ctgcccgcca ccctccgggc cgttgcttcg caacgttcaa atccgctccc ggcggatttg 1200
tcctactcag gagagcgttc accgacaaac aacagataaa acgaaaggcc cagtctttcg 1260
actgagcctt tcgtttattt tgatgcctgg cagttcccta ctctcgcatg gggagacccc 1320
acactaccat cggcgctacg gcgtttcact tctgagttcg gcatggggtc aggtgggacc 1380
accgcgctac tgccgccagg caaattctgt tttatcagac cgcttctgcg ttctgattta 1440
atctgtatca ggctgaaaat cttctctcat ccgccaaaac aggatccaat tatggcagat 1500
caatgagctt cacagacaca atatcaggga catttgttag ttcttttcaca atttttatctt 1560
ccagatgtct gtcaaaggaa agcatcatga tggcttctcc gccttttttcc ttacggccaa 1620
cctgcatagt tgcaatgtta atatcattat ctccgagaat acgtcctact cggccgatga 1680
cacctgttgt atcttgatgc tggatataca ccaagtgacc agtcggataa aaatcaatat 1740
taaatccatt gatctcgaca attcgttctc cgaaatgagg aatatacgta gccgttacag 1800
taaaggtgct gcggtctcct gtcacttttta cgctgatgca gttatcgtat ccagattcag 1860
aagaggaaat tttttcactg aagctaatgc cgcgttcttt tgcgacaccc ccggcattga 1920
cctcattaac agtagagtct acgcgcggtt ttaaaaagcc tgacagaagg gctttttgtaa 1980
tgaacgatgt ttcaagttta gcaattgtgc cttcatattg aatggcaaca tcctgtactg 2040
gttctttcat gcactgtgat acaaggctgc caatttttcc tgcaatttga tggtaaggct 2100
taattttagc aaattcatct tttgtcatgg caggcaggtt gatagctgac atgacaggca 2160
ggcctttttgc gaactgcaga acttcttctg cacttgggc ggcgacattg agctgtgctt 2220
ctttcgttga tgctcccaag tgaggagtgg caatgactaa tggatgatca acaagtttgt 2280
tgtcaactgg cggttcgact tcgaaaacgt caagcgctgc tcccgcaaca tgcccgtttt 2340
ccaaagcttc gagaagtgct gcttcatcga taattccgcc tcgcgcacag ttaattaagc 2400
gaacgccttt tttcgttttt gcaatcgttt ctttattcaa taagcctttt gtttcttttg 2460
ttaaaggcgt gtgaacggta atgatatccg cactttcaag cacttcttca aatgtacggc 2520
tgtttacgcc gatttttttc gctctttctt ccgttaagaa aggatcaaaa acgtgcacag 2580
tcataccgaa cgctcctcga cgctgtgcaa tttcacttcc gattcggcct aatcctacaa 2640
taccaagcgt ttttccataa agctctgaac cgacataagc tgtgcggttc cactctctgg 2700
atttcactga gatattagcc tgcggaatgt gtctcattaa agaagagatc attgcaaatg 2760
tatgctcagc tgtcgaaatg gtgttgccgt tcggagcatt gatcacgatt accccgtgtt 2820
tcgtagcctc atcaatatcg atattatcga caccgacacc ggctcttccg acaatttta 2880
aagaagtcat tttgttgaaa aggtcttctg ttactttttgt cgcgcttcgc accaaaagag 2940
catcaaaagt atgtaattca tcttctgcat ctgctacgtt tttttgaacg atttcaataa 3000
```

```
agtctgattc aataagtggc tgtaaaccgt cgttgctcat tttgtctgag accaatactc 3060
gaaacatgtt ttctcctcct ctagagcgtc ctgctgttgt taagattatt ataccacacc 3120
ttgtagataa agtcaacaac tttttgcaaa attttttcagg aattttagca gaggttgttc 3180
tggatgtaga acaaaacatc tttccgctct tgtgctgtta ggatatcttt cttggaagct 3240
aggtaggcct cgagttatgg cagttggtta aaaggaaaca aaaagaccgt tttcacacaa 3300
aacggtcttt ttcgatttct ttttacagtc acagccactt ttgcaaaaac cggacagctt 3360
catgccttat aactgctgtt tcggtcgaca agcttcgcga agcggccgca aaattcactg 3420
gccgtcgttt tacaacgtcg tgactgggaa aaccctggcg ttacccaact taatcgcctt 3480
gcagcacatc cccctttcgc cagctggcgt aatagcgaag aggcccgcac cgatcgccct 3540
tcccaacagt tgcgcagcct gaatggcgaa tggcgcctga tgcggtattt tctccttacg 3600
catctgtgcg gtatttcaca ccgcatatgg tgcactctca gtacaatctg ctctgatgcc 3660
gcatagttaa gccagccccg acacccgcca acacccgctg actatgcttg taaaccgttt 3720
tgtgaaaaaa tttttaaaat aaaaaagggg acctctaggg tccccaatta attagtaata 3780
taatctatta aaggtcattc aaaaggtcat ccaccggatc agcttagtaa agccctcgct 3840
agattttaat gcggatgttg cgattacttc gccaactatt gcgataacaa gaaaaagcca 3900
gcctttcatg atatatctcc caatttgtgt agggcttatt atgcacgctt aaaaataata 3960
aaagcagact tgacctgata gtttggctgt gagcaattat gtgcttagtg catctaacgc 4020
ttgagttaag ccgcgccgcg aagcggcgtc ggcttgaacg aattgttaga cattatttgc 4080
cgactacctt ggtgatctcg cctttcacgt agtggacaaa ttcttccaac tgatctgcgc 4140
gcgaggccaa gcgatcttct tcttgtccaa gataagcctg tctagcttca agtatgacgg 4200
gctgatactg ggccggcagg cgctccattg cccagtcggc agcgacatcc ttcggcgcga 4260
ttttgccggt tactgcgctg taccaaatgc gggacaacgt aagcactaca tttcgctcat 4320
cgccagccca gtcgggcggc gagttccata gcgttaaggt ttcatttagc gcctcaaata 4380
gatcctgttc aggaaccgga tcaaagagtt cctccgccgc tggacctacc aaggcaacgc 4440
tatgttctct tgcttttgtc agcaagatag ccagatcaat gtcgatcgtg gctggctcga 4500
agatacctgc aagaatgtca ttgcgctgcc attctccaaa ttgcagttcg cgcttagctg 4560
gataacgcca cggaatgatg tcgtcgtgca caacaatggt gacttctaca gcgcggagaa 4620
tctcgctctc tccaggggga gccgaagttt ccaaaaggtc gttgatcaaa gctcgccgcg 4680
ttgtttcatc aagccttacg gtcaccgtaa ccagcaaatc aatatcactg tgtggcttca 4740
ggccgccatc cactgcggag ccgtacaaat gtacggccag caacgtcggt tcgagatggc 4800
gctcgatgac gccaactacc tctgatagtt gagtcgatac ttcggcgatc accgcttccc 4860
tcatgatgtt taactttgtt ttagggcgac tgccctgctg cgtaacatcg ttgctgctcc 4920
ataacatcaa acatcgaccc acggcgtaac gcgcttgctg cttggatgcc cgaggcatag 4980
actgtacccc aaaaaaacag tcataacaag ccatgaaaac cgccactgcg ccgttaccac 5040
cgctgcgttc ggtcaaggtt ctggaccagt tgcgtgagcg catacgctac ttgcattaca 5100
gcttacgaac cgaacaggct tatgtccact gggttcgtgc cttcatccgt ttccacggtg 5160
tgcgtcaccc ggcaaccttg ggcagcagcg aagtcgaggc atttctgtcc tggctggcga 5220
acgagcgcaa ggtttcggtc tccacgcatc gtcaggcatt ggcggccttg ctgttcttct 5280
acggcaaggt gctgtgcacg gatctgccct ggcttcagga gatcggaaga cctcggccgt 5340
cgcggcgctt gccggtggtg ctgaccccgg atgaagtggt tcgcatcctc ggttttctgg 5400
aaggcgagca tcgttgttc gcccagcttc tgtatggaac gggcatgcgg atcagtgagg 5460
gtttgcaact gcgggtcaag gatctggatt tcgatcacgg cacgatcatc gtgcgggagg 5520
gcaagggctc caaggatcgg gccttgatgt tacccgagag cttggcaccc agcctgcgcg 5580
agcaggggaa ttgatccggt ggatgacctt ttgaatgacc tttaatagat tatattacta 5640
attaattggg gaccctagag gtcccctttt ttattttaaa aattttttca caaaacggtt 5700
tacaagcata acgggttttg ctgcccgcaa acgggctgtt ctggtgttgc tagtttgtta 5760
tcagaatcgc agatccggct tcaggtttgc cggctgaaag cgctatttct tccagaattg 5820
ccatgatttt ttccccacgg gaggcgtcac tggctcccgt gttgtcggca gctttgattc 5880
gataagcagc atcgcctgtt tcaggctgtc tatgtgtgac tgttgagctg taacaagttg 5940
tctcaggtgt tcaatttcat gttctagttg ctttgtttta ctggtttcac ctgttctatt 6000
aggtgttaca tgctgttcat ctgttacatt gtcgatctgt tcatggtgaa cagctttaaa 6060
tgcaccaaaa actcgtaaaa gctctgatgt atctatcttt tttacaccgt tttcatctgt 6120
gcatatggac agttttccct ttgatatcta acggtgaaca gttgttctac ttttgtttgt 6180
tagtcttgat gcttcactga tagatacaag agccataaga acctcagatc cttccgtatt 6240
tagccagtat gttctctagt gtggttcgtt gtttttgcgt gagccatgag aacgaaccat 6300
tgagatcatg cttactttgc atgtcactca aaaattttgc ctcaaaactg gtgagctgaa 6360
tttttgcagt taaagcatcg tgtagtgttt ttcttagtcc gttacgtagg taggaatctg 6420
atgtaatggt tgttggtatt ttgtcaccat tcattttat ctggttgttc tcaagttcgg 6480
ttacgagatc catttgtcta tctagttcaa cttggaaaat caacgtatca gtcgggcggc 6540
```

```
ctcgcttatc aaccaccaat ttcatattgc tgtaagtgtt taaatcttta cttattggtt 6600
tcaaaaccca ttggttaagc cttttaaact catggtagtt attttcaagc attaacatga 6660
acttaaattc atcaaggcta atctctatat ttgccttgtg agttttcttt tgtgttagtt 6720
cttttaataa ccactcataa atcctcatag agtatttgtt ttcaaaagac ttaacatgtt 6780
ccagattata ttttatgaat ttttttaact ggaaaagata aggcaatatc tcttcactaa 6840
aaactaattc taatttttcg cttgagaact tggcatagtt tgtccactgg aaaatctcaa 6900
agcctttaac caaaggattc ctgatttcca cagttctcgt catcagctct ctggttgctt 6960
tagctaatac accataagca ttttccctac tgatgttcat catctgagcg tattggttat 7020
aagtgaacga taccgtccgt tctttccttg tagggttttc aatcgtgggg ttgagtagtg 7080
ccacacagca taaaattagc ttggtttcat gctccgttaa gtcatagcga ctaatcgcta 7140
gttcatttgc tttgaaaaca actaattcag acatacatct caattggtct aggtgatttt 7200
aatcactata ccaattgaga tgggctagtc aatgataatt actagtcctt ttcctttgag 7260
ttgtgggtat ctgtaaattc tgctagacct ttgctggaaa acttgtaaat tctgctagac 7320
cctctgtaaa ttccgctaga cctttgtgtg tttttttttgt ttatattcaa gtggttataa 7380
tttatagaat aaagaaagaa taaaaaaaga taaaaagaat agatcccagc cctgtgtata 7440
actcactact ttagtcagtt ccgcagtatt acaaaaggat gtcgcaaacg ctgtttgctc 7500
ctctacaaaa cagaccttaa aaccctaaag gcttaagtag caccctcgca agctcgggca 7560
aatcgctgaa tattcctttt gtctccgacc atcaggcacc tgagtcgctg tcttttttcgt 7620
gacattcagt tcgctgcgct cacggctctg gcagtgaatg ggggtaaatg gcactacagg 7680
cgcctttttat ggattcatgc aaggaaacta cccataatac aagaaaagcc cgtcacgggc 7740
ttctcagggc gtttttatggc gggtctgcta tgtggtgcta tctgactttt tgctgttcag 7800
cagttcctgc cctctgattt tccagtctga ccacttcgga ttatcccgtg acaggtcatt 7860
cagactggct aatgcaccca gtaaggcagc ggtatcatca acaggcttac ccgtcttact 7920
gtcaac                                                                7926
```

```
<210> 25
<211> 7701
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:glyA overexpression
<223> plasmid

<400> 25
gaattttgcg gccgcttcga aagctgtaat ataaaaacct tcttcaacta acggggcagg 60
ttagtgacat tagaaaaccg actgtaaaaa gtacagtcgg cattatctca tattataaaa 120
gccagtcatt aggcctatct gacaattcct gaatagagtt cataaacaat cctgcatgat 180
aaccatcaca aacagaatga tgtacctgta aagatagcgg taaatatatt gaattacctt 240
tattaatgaa ttttcctgct gtaataatgg gtagaaggta attactatta ttattgatat 300
ttaagttaaa cccagtaaat gaagtccatg gaataataga aagagaaaaa gcattttcag 360
gtataggtgt tttgggaaac aatttccccg aaccattata tttctctaca tcagaaaggt 420
ataaatcata aaactctttg aagtcattct ttacaggagt ccaaatacca gagaatgttt 480
tagatacacc atcaaaaatt gtataaagtg gctctaactt atcccaataa cctaactctc 540
cgtcgctatt gtaaccagtt ctaaaagctg tatttgagtt tatcaccctt gtcactaaga 600
aaataaatgc agggtaaaat ttatatcctt cttgttttat gtttcggtat aaaacactaa 660
tatcaatttc tgtggttata ctaaaagtcg tttgttggtt caaataatga ttaaatatct 720
cttttctctt ccaattgtct aaatcaattt tattaaagtt catttgatat gcctcctaaa 780
ttttttatcta aagtgaattt aggaggctta cttgtctgct ttcttcatta gaatcaatcc 840
ttttttaaaa gtcaatatta ctgtaacata aatatatatt ttaaaaatat cccactttat 900
ccaattttcg tttgttgaac taatgggtgc tttagttgaa gaataaagac cacattaaaa 960
aatgtggtct tttgtgtttt tttaaaggat ttgagcgtag cgaaaaatcc ttttctttct 1020
tatcttgata ataagggtaa ctattgaatt cggtaccaag agtttgtaga aacgcaaaaa 1080
ggccatccgt caggatggcc ttctgcttaa tttgatgcct ggcagtttat ggcggggcgtc 1140
ctgcccgcca ccctccgggc cgttgcttcg caacgttcaa atccgctccc ggcggatttg 1200
tcctactcag gagagcgttc accgacaaac aacagataaa acgaaaggcc cagtctttcg 1260
actgagcctt tcgtttttatt tgatgcctgg cagttcccta ctctcgcatg gggagacccc 1320
acactaccat cggcgctacg gcgtttcact tctgagttcg catgggggtc aggtgggacc 1380
accgcgctac tgccgccagg caaattctgt tttatcagac cgcttctgcg ttctgattta 1440
```

```
atctgtatca ggctgaaaat cttctctcat ccgccaaaac aggatccccc atcaacaatt 1500
acacacttct attgattcta caaaaaaaga cattgagttt caagaacatc gtcaaaaaac 1560
ccgccgggca taagcccaag cgggtttttag gatcttaata atctaattct ttatataaag 1620
gaaatttatc agtcagagca gctacacgct gtcttgcttc ttcaagtttt ccttcatctt 1680
cgtggttttt caatgcaagc gcaatgatag caccgacttc ttctaatgcg tctccgtcaa 1740
aaccgcggct ggttacagca gctgtaccaa gacggatgcc gcttgttacg aaaggttttt 1800
caggatcata tggaatcgcg ttttttgttag acgtaatacc aatttcatca agtacatgct 1860
ccgcaacctt accagtcagt ccgagcgaac gaaggtcaac aaggataagg tggttgtctg 1920
ttccgcctga aacgagctgg atgccctctt tcgttaaggc ttcagccaga cgtttcgcgt 1980
ttgaaatgac gttttgtgca tatgtttga aatcgtcctg caatacttca ccgaatgaaa 2040
cagcttttgc ggcaataacg tgcatcagag ggccgccttg aattccaggg aagatcgatt 2100
tatcaatttt cttgccaaac tcttcacggc aaaggatcat accgccgcga ggaccgcgaa 2160
gtgttttatg tgttgttgtt gtaacgaaat cagcgtaagg aaccgggttt ggatgaaggc 2220
ctgccgcaac aagtcctgcg atatgtgcca tatccaccat gaagtaagcg ccgacttcat 2280
cagcaatttc acggaatttc ttaaagtcga ttgtacgagg atacgcactt gctcctgcta 2340
cgataagctt cggtttatga gcgagggctt tttcacgcac gtcatcgtaa tcaatatatt 2400
gagtttcttt atctacgccg tactcaacaa agttatattg aacaccgctg aagttgactg 2460
ggcttccgtg tgttaaatgg ccgccgtggg agaggttcat cccaagtaca gtatcgcctt 2520
gctccaaaat cgtgaagtac actgccatgt ttgcttgtgc cctgaatga ggctgaacgt 2580
ttacatgctc cgctccaaag atttccttcg cgcggtcacg ggcgatatct tcaacgacat 2640
cgacgtgctc gcatccgccg tagtagcgtt tgcccggata tccttctgcg tacttatttg 2700
tcaaaacaga tccttgtgct tccataaccg cttcacttac aaagttctca gaagcaatca 2760
attcgatctt agtctgttgg cgttcacgct cattttaat ggcgttaaac acttgttcgt 2820
cttgcgcagg taaatgtttc atgtttacac ctcctctaga gcgtcctgct gttgttaaga 2880
ttattatacc acaccttgta gataaagtca acaacttttt gcaaaatttt tcaggaattt 2940
tagcagaggt tgttctggat gtagaacaaa acatctttcc gctcttgtgc tgttaggata 3000
tctttcttgg aagctaggta ggcctcgagt tatggcagtt ggttaaaagg aaacaaaaag 3060
accgttttca cacaaaacgg tctttttcga tttcttttta cagtcacagc cactttttgca 3120
aaaaccggac agcttcatgc cttataactg ctgtttcggt cgacaagctt cgcgaagcgg 3180
ccgcaaaatt cactgtgccgt cgttttacaa cgtcgtgact gggaaaaccc tggcgttacc 3240
caacttaatc gccttgcagc acatccccct ttcgccagct ggcgtaatag cgaagaggcc 3300
cgcaccgatc gcccttccca acagttgcgc agcctgaatg gcgaatggcg cctgatgcgg 3360
tattttctcc ttacgcatct gtgcggtatt tcacaccgca tatggtgcac tctcagtaca 3420
atctgctctg atgccgcata gttaagccag ccccgacacc cgccaacacc cgctgactat 3480
gcttgtaaac cgttttgtga aaaaatttt aaaataaaaa aggggacctc tagggtcccc 3540
aattaattag taatataatc tattaaaggt cattcaaaag gtcatccacc ggatcagctt 3600
agtaaagccc tcgctagatt ttaatgcgga tgttgcgatt acttcgccaa ctattgcgat 3660
aacaagaaaa agccagcctt tcatgatata tctcccaatt tgtgtagggc ttattatgca 3720
cgcttaaaaa taataaaagc agacttgacc tgatagtttg gctgtgagca attatgtgct 3780
tagtgcatct aacgcttgag ttaagccgcg ccgcgaagcg cgtcggctt gaacgaattg 3840
ttagacatta tttgccgact accttggtga tctcgccttt cacgtagtgg acaaattctt 3900
ccaactgatc tgcgcgcgag gccaagcgat cttcttcttg tccaagataa gcctgtctag 3960
cttcaagtat gacgggctga tactgggccg gcaggcgctc cattgcccag tcggcagcga 4020
catccttcgg cgcgattttg ccggttactg cgctgtacca aatgcgggac aacgtaagca 4080
ctacatttcg ctcatcgcca gcccagtcgg cggcgagtt ccatagcgtt aaggtttcat 4140
ttagcgcctc aaatagatcc tgttcaggaa ccggatcaaa gagttcctcc gccgctggac 4200
ctaccaaggc aacgctatgt tctcttgctt ttgtcagcaa gatagccaga tcaatgtcga 4260
tcgtggctgg ctcgaagata cctgcaagaa tgtcattgcg ctgccattct ccaaattgca 4320
gttcgcgctt agctggataa cgccacggaa tgatgtcgtc gtgcacaaca atggtgactt 4380
ctacagcgcg gagaatctcg ctctctccag gggaagccga agtttccaaa aggtcgttga 4440
tcaaagctcg ccgcgttgtt tcatcaagcc ttacggtcac cgtaaccagc aaatcaatat 4500
cactgtgtgg cttcaggccg ccatccactg cggagccgta caaatgtacg gccagcaacg 4560
tcggttcgag atggcgctcg atgacgccaa ctacctctga tagttgagtc gatacttcgg 4620
cgatcaccgc ttccctcatg atgtttaact ttgttttagg gcgactgccc tgctgcgtaa 4680
catcgttgct gctccataac atcaaacatc gacccacggc gtaacgcgct tgctgcttgg 4740
atgcccgagg catagactgt accccaaaaa aacagtcata acaagccatg aaaaccgcca 4800
ctgcgccgtt accaccgctg cgttcggtca aggttctgga ccagttgcgt gagcgcatac 4860
gctacttgca ttacagctta cgaaccgaac aggcttatgt ccactgggtt cgtgccttca 4920
tccgtttcca cggtgtgcgt cacccggcaa ccttgggcag cagcgaagtc gaggcatttc 4980
```

```
tgtcctggct ggcgaacgag cgcaaggttt cggtctccac gcatcgtcag gcattggcgg 5040
ccttgctgtt cttctacggc aaggtgctgt gcacggatct gccctggctt caggagatcg 5100
gaagacctcg gccgtcgcgg cgcttgccgg tggtgctgac cccggatgaa gtggttcgca 5160
tcctcggttt tctggaaggc gagcatcgtt tgttcgccca gcttctgtat ggaacgggca 5220
tgcggatcag tgagggtttg caactgcggg tcaaggatct ggatttcgat cacggcacga 5280
tcatcgtgcg ggagggcaag ggctccaagg atcgggcctt gatgttaccc gagagcttgg 5340
cacccagcct gcgcgagcag gggaattgat ccggtggatg accttttgaa tgacctttaa 5400
tagattatat tactaattaa ttggggaccc tagaggtccc cttttttatt ttaaaaattt 5460
tttcacaaaa cggtttacaa gcataacggg ttttgctgcc cgcaaacggg ctgttctggt 5520
gttgctagtt tgttatcaga atcgcagatc cggcttcagg tttgccggct gaaagcgcta 5580
tttcttccag aattgccatg attttttccc cacgggaggc gtcactggct cccgtgttgt 5640
cggcagcttt gattcgataa gcagcatcgc ctgtttcagg ctgtctatgt gtgactgttg 5700
agctgtaaca agttgtctca ggtgttcaat ttcatgttct agttgctttg ttttactggt 5760
ttcacctgtt ctattaggtg ttacatgctg ttcatctgtt acattgtcga tctgttcatg 5820
gtgaacagct ttaaatgcac caaaaactcg taaaagctct gatgtatcta tcttttttac 5880
accgttttca tctgtgcata tggacagttt tccctttgat atctaacggt gaacagttgt 5940
tctacttttg tttgttagtc ttgatgcttc actgatagat acaagagcca taagaacctc 6000
agatccttcc gtatttagcc agtatgttct ctagtgtggt tcgttgtttt tgcgtgagcc 6060
atgagaacga accattgaga tcatgcttac tttgcatgtc actcaaaaat tttgcctcaa 6120
aactggtgag ctgaattttt gcagttaaag catcgtgtag tgttttttctt agtccgttac 6180
gtaggtagga atctgatgta atggttgttg gtattttgtc accattcatt tttatctggt 6240
tgttctcaag ttcggttacg agatccattt gtctatctag ttcaacttgg aaaatcaacg 6300
tatcagtcgg gcggcctcgc ttatcaacca ccaatttcat attgctgtaa gtgtttaaat 6360
ctttacttat tggtttcaaa acccattggt taagcctttt aaactcatgg tagttatttt 6420
caagcattaa catgaactta aattcatcaa ggctaatctc tatatttgcc ttgtgagttt 6480
tcttttgtgt tagttctttt aataaccact cataaatcct catagagtat ttgttttcaa 6540
aagacttaac atgttccaga ttatatttta tgaatttttt taactggaaa agataaggca 6600
atatctcttc actaaaaact aattctaatt tttcgcttga gaacttggca tagtttgtcc 6660
actggaaaat ctcaaagcct ttaaccaaag gattcctgat ttccacagtt ctcgtcatca 6720
gctctctggt tgctttagct aatacaccat aagcattttc cctactgatg ttcatcatct 6780
gagcgtattg gttataagtg aacgataccg tccgttcttt ccttgtaggg ttttcaatcg 6840
tggggttgag tagtgccaca cagcataaaa ttagcttggt ttcatgctcc gttaagtcat 6900
agcgactaat cgctagttca tttgctttga aaacaactaa ttcagacata catctcaatt 6960
ggtctaggtg attttaatca ctataccaat tgagatgggc tagtcaatga taattactag 7020
tccttttcct ttgagttgtg ggtatctgta aattctgcta gacctttgct ggaaaacttg 7080
taaattctgc tagaccctct gtaaattccg ctagaccttt gtgtgttttt tttgtttata 7140
ttcaagtggt tataatttat agaataaaga aagaataaaa aaagataaaa agaatagatc 7200
ccagccctgt gtataactca ctactttagt cagttccgca gtattacaaa aggatgtcgc 7260
aaacgctgtt tgctcctcta caaaacagac cttaaaaccc taaaggctta agtagcaccc 7320
tcgcaagctc gggcaaatcg ctgaatattc cttttgtctc cgaccatcag gcacctgagt 7380
cgctgtcttt ttcgtgacat tcagttcgct gcgctcacgg ctctggcagt gaatggggggt 7440
aaatggcact acaggcgcct tttatggatt catgcaagga aactacccat aatacaagaa 7500
aagcccgtca cgggcttctc agggcgtttt atggcgggtc tgctatgtgg tgctatctga 7560
ctttttgctg ttcagcagtt cctgccctct gattttccag tctgaccact tcggattatc 7620
ccgtgacagg tcattcagac tggctaatgc acccagtaag gcagcggtat catcaacagg 7680
cttacccgtc ttactgtcaa c                                          7701
```

<210> 26
<211> 3888
<212> DNA
<213> Artificial Sequence

<220>
<223> plasmid

<400> 26
```
tgcgccgcta cagggcgcgt ccattcgcca ttcaggctgc gcaactgttg ggaagggcga 60
tcggtgcggg cctcttcgct attacgccag tttgggggtg agttcatgaa gtttcgtcgc 120
agcggcagat tggtggactt aacaaattat ttgttaaccc atccgcacga gttaataccg 180
```

```
ctaacctttt tctctgagcg gtatgaatct gcaaaatcat cgatcagtga agatttaaca 240
attattaaac aaacctttga acagcagggg attggtactt tgcttactgt tcccggagct 300
gccggaggcg ttaaatatat tccgaaaatg aagcaggctg aagctgaaga gtttgtgcag 360
acacttggac agtcgctggc aaatcctgag cgtatccttc cggcggtta tgtatattta 420
acggatatct taggaaagcc atctgtactc tccaaggtag ggaagctgtt tgcttccgtg 480
tttgcagagc gcgaaattga tgttgtcatg accgttgcca cgaaaggcat ccctcttgcg 540
tacgcagctg caagctattt gaatgtgcct gttgtgatcg ttcgtaaaga caataaggta 600
acagagggct ccacagtcag cattaattac gtttcaggct cctcaaaccg cattcaaaca 660
atgtcacttg cgaaaagaag catgaaaacg ggttcaaacg tactcattat tgatgacttt 720
atgaaagcag cggcaccat taatggtatg attaacctgt tggatgagtt taacgcaaat 780
gtggcgggaa tcggcgtctt agttgaagcc gaaggagtag atgaacgtct tgttgacgaa 840
tatatgtcac ttcttactct ttcaaccatc aacatgaaag agaagtccat tgaaattcag 900
aatggcaatt ttctgcgttt ttttaaagac aatcttttaa agaatggaga gacagaatca 960
tgacaaaagc agtccacaca aaacatgccc cagcggcaat cgggccttat tcacaaggga 1020
ttatcgtcaa caatatgttt tacagctcag gccaaatccc tttgactcct tcaggcgaaa 1080
tggtgaatgg cgatattaag gagcagactc atcaagtatt cagcaattta aaggcggttc 1140
tggaagaagc gggtgcttct tttgaaacag ttgtaaaagc aactgtattt atcgcggata 1200
tggaacagtt tgcggaagta aacgaagtgt acggacaata ttttgacact cacaaaccgg 1260
cgagatcttg tgttgaagtc gcgagactcc cgaaggatgc gttagtcgag atcgaagtta 1320
ttgcactggt gaaataataa gaaaagtgat tctgggagag ccgggatcac tttttatt 1380
accttatgcc cgaaatgaaa gctttatgac cctgcattaa tgaatcggcc aacgcgcggg 1440
gagaggcggt ttgcgtattg ggcgctcttc cgcttcctcg ctcactgact cgctgcgctc 1500
ggtcgttcgg ctgcggcgag cggtatcagc tcactcaaag gcggtaatac ggttatccac 1560
agaatcaggg gataacgcag gaaagaacat gtgagcaaaa ggccagcaaa aggccaggaa 1620
ccgtaaaaag gccgcgttgc tggcgttttt cgataggctc cgcccccctg acgagcatca 1680
caaaaatcga cgctcaagtc agaggtggcg aaacccgaca ggactataaa gataccaggc 1740
gtttccccct ggaagctccc tcgtgcgctc tcctgttccg accctgccgc ttaccggata 1800
cctgtccgcc tttctccctt cgggaagcgt ggcgctttct catagctcac gctgtaggta 1860
tctcagttcg gtgtaggtcg ttcgctccaa gctgggctgt gtgcacgaac cccccgttca 1920
gcccgaccgc tgcgccttat ccggtaacta tcgtcttgag tccaacccgg taagacacga 1980
cttatcgcca ctggcagcag ccactggta caggattagc agagcgaggt atgtaggcgg 2040
tgctacagag ttcttgaagt ggtggcctaa ctacggctac actagaagga cagtatttgg 2100
tatctgcgct ctgctgaagc cagttacctt cggaaaaaga gttggtagct cttgatccgg 2160
caaacaaacc accgctggta gcggtggttt ttttgtttgc aagcagcaga ttacgcgcag 2220
aaaaaaagga tctcaagaag atcctttgat cttttctacg gggtctgacg ctcagtggaa 2280
cgaaaactca cgttaaggga ttttggtcat gagattatca aaaaggatct tcacctagat 2340
ccttttaaat taaaaatgaa gttttaaatc aatctaaagt atatatgagt aaacttggtc 2400
tgacagttac caatgcttaa tcagtgaggc acctatctca gcgatctgtc tatttcgttc 2460
atccatagtt gcctgactcc ccgtcgtgta gataactacg atacgggagg gcttaccatc 2520
tggccccagt gctgcaatga taccgcgaga cccacgctca ccggctccag atttatcagc 2580
aataaaccag ccagccggaa gggccgagcg cagaagtggt cctgcaactt tatccgcctc 2640
catccagtct attaattgtt gccgggaagc tagagtaagt agttcgccag ttaatagttt 2700
gcgcaacgtt gttggcattg ctacaggcat cgtggtgtca cgctcgtcgt ttggtatggc 2760
ttcattcagc tccggttccc aacgatcaag gcgagttaca tgatccccca tgttgtgcaa 2820
aaaagcggtt agctccttcg gtcctccgat cgttgtcaga agtaagttgg ccgcagtgtt 2880
atcactcatg gttatggcag cactgcataa ttctcttact gtcatgccat ccgtaagatg 2940
cttttctgtg actggtgagt actcaaccaa gtcattctga gaataccgcg cccggcgacc 3000
gagttgctct tgcccggcgt caatacggga taatagtgta tgacatagca gaactttaaa 3060
agtgctcatc attggaaaac gttcttcggg gcgaaaactc tcaaggatct taccgctgtt 3120
gagatccagt tcgatgtaac ccactcgtgc acccaactga tcttcagcat ctttttactt 3180
caccagcgtt tctgggtgag caaaaacagg aaggcaaat gccgcaaaa agggaataag 3240
ggcgacacgg aaatgttgaa tactcatact cttccttttt caatattatt gaagcattta 3300
tcagggttat tgtctcatga gcggatacat atttgaatgt atttagaaaa ataaacaaat 3360
aggggttccg cgcacatttc cccgaaaagt gccacctgta tgcggtgtga ataccgcac 3420
agatgcgtaa ggagaaaata ccgcatcagg cgaaattgta acgttaata ttttgttaaa 3480
attcgcgtta aatatttgtt aaatcagctc attttttaac caataggccg aaatcggcaa 3540
aatcccttat aaatcaaaag aatagaccga gatagggttg agtgttgttc cagtttggaa 3600
caagagtcca ctattaaaga acgtggactc caacgtcaaa gggcgaaaaa ccgtctatca 3660
gggcgatggc ccactacgtg aaccatcacc caaatcaagt tttttgcggt cgaggtgccg 3720
```

```
taaagctcta aatcggaacc ctaaagggag cccccgattt agagcttgac ggggaaagcc 3780
ggcgaacgtg gcgagaaagg aagggaagaa agcgaaagga gcgggcgcta gggcgctggc 3840
aagtgtagcg gtcacgctgc gcgtaaccac cacacccgcc gcgcttaa               3888
```

<210> 27
<211> 4606
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:plasmid

<400> 27

```
tgcgccgcta cagggcgcgt ccattcgcca ttcaggctgc gcaactgttg ggaagggcga 60
tcggtgcggg cctcttcgct attacgccag ctggcgaaag ggggatgtgc tgcaaggcga 120
ttaagttggg taacgccagg gttttcccag tcacgacgtt gtaaaacgac ggccagtgaa 180
ttgtaatacg actcactata gggcgaattg ggcccgacgt cgcatgctcc cggccgccat 240
ggccgcggga tgcggccgcg tcgacgtgaa ataccgcaca gatgcgtaag gagaaaatac 300
cgcatcaggc gataaaccca gcgaaccatt tgaggtgata ggtaagatta taccgaggta 360
tgaaaacgag aattggacct ttacagaatt actctatgaa gcgccatatt taaaaagcta 420
ccaagacgaa gaggatgaag aggatgagga ggcagattgc cttgaatata ttgacaatac 480
tgataagata atatatcttt tatatagaag atatcgccgt atgtaaggat ttcagggggc 540
aaggcatagg cagcgcgctt atcaatatat ctatagaatg ggcaaagcat aaaaacttgc 600
atggactaat gcttgaaacc caggacaata accttatagc ttgtaaattc tatcataatt 660
gtggtttcaa aatcggctcc gtcgatacta tgttatacgc caactttcaa aacaactttg 720
aaaaagctgt tttctggtat ttaaggtttt agaatgcaag gaacagtgaa ttggagttcg 780
tcttgttata attagcttct tggggtatct ttaaatactg tagaaaagag gaaggaaata 840
ataaatggct aaaatgagaa tatcaccgga attgaaaaaa ctgatcgaaa aataccgctg 900
cgtaaaagat acggaaggaa tgtctcctgc taaggtatat aagctggtgg gagaaaatga 960
aaacctatat ttaaaaatga cggacagccg gtataaaggg accacctatg atgtggaacg 1020
ggaaaaggac atgatgctat ggctggaagg aaagctgcct gttccaaagg tcctgcactt 1080
tgaacggcat gatggctgga gcaatctgct catgagtgag gccgatggcg tcctttgctc 1140
ggaagagtat gaagatgaac aaagccctga aaagattatc gagctgtatg cggagtgcat 1200
caggctcttt cactccatcg acatatcgga ttgtccctat acgaatagct tagacagccg 1260
cttagccgaa ttggattact tactgaataa cgatctggcc gatgtggatt gcgaaaactg 1320
ggaagaagac actccatttta aagatccgcg cgagctgtat gattttttaa agacggaaaa 1380
gcccgaagag gaacttgtct tttcccacgg cgacctggga gacagcaaca tctttgtgaa 1440
agatggcaaa gtaagtggct ttattgatct gggagaagc ggcagggcgg acaagtggta 1500
tgacattgcc ttctgcgtcc ggtcgatcag ggaggatatc ggggaagaac agtatgtcga 1560
gctatttttt gacttactgg ggatcaagcc tgattgggag aaaataaaat attatatttt 1620
actggatgaa ttgtttttagt acctagattt agatgtctaa aaagctttaa ctacaagctt 1680
tttagacatc taatcttttc tgaagtacat ccgcaactgt ccatactctg atgtttttata 1740
tcttttctaa aagttcgcta gatagggggtc ccgagcgcct acgaggaatt tgtatcgcca 1800
ttcgccattc aggctgcgca actgttggga agggcgatcg gtgcgggtac cgggatcact 1860
agtgcggccg cctgcaggtc gaccatatgg gagagctccc aacgcgttgg atgcatagct 1920
tgagtattct atagtgtcac ctaaatagct tggcgtaatc atggtcatag ctgtttcctg 1980
tgtgaaattg ttatccgctc acaattccac acaacatacg agccggaagc ataaagtgta 2040
aagcctgggg tgcctaatga gtgagctaac tcacattaat tgcgttgcgc tcactgcccg 2100
ctttccagtc gggaaacctg tcgtgccagc tgcattaatg aatcggccaa cgcgcgggga 2160
gaggcggttt gcgtattggg cgctcttccg cttcctcgct cactgactcg ctgcgctcgg 2220
tcgttcggct gcggcgagcg gtatcagctc actcaaaggc ggtaatacgg ttatccacag 2280
aatcagggga taacgcagga aagaacatgt gagcaaaagg ccagcaaaag gccaggaacc 2340
gtaaaaaggc cgcgttgctg gcgtttttcg ataggctccg ccccctgac gagcatcaca 2400
aaaatcgacg ctcaagtcag aggtggcgaa acccgacagg actataaaga taccaggcgt 2460
ttccccctgg aagctccctc gtgcgctctc ctgttccgac cctgccgctt accggatacc 2520
tgtccgcctt tctcccttcg ggaagcgtgg cgctttctca tagctcacgc tgtaggtatc 2580
tcagttcggt gtaggtcgtt cgctccaagc tgggctgtgt gcacgaaccc ccgttcagc 2640
ccgaccgctg cgccttatcc ggtaactatc gtcttgagtc caacccggta agacacgact 2700
tatcgccact ggcagcagcc actggtaaca ggattagcag agcgaggtat gtaggcggtg 2760
```

```
ctacagagtt cttgaagtgg tggcctaact acggctacac tagaaggaca gtatttggta 2820
tctgcgctct gctgaagcca gttaccttcg gaaaaagagt tggtagctct tgatccggca 2880
aacaaaccac cgctggtagc ggtggttttt ttgtttgcaa gcagcagatt acgcgcagaa 2940
aaaaaggatc tcaagaagat cctttgatct tttctacggg gtctgacgct cagtggaacg 3000
aaaactcacg ttaagggatt ttggtcatga gattatcaaa aaggatcttc acctagatcc 3060
ttttaaatta aaaatgaagt tttaaatcaa tctaaagtat atatgagtaa acttggtctg 3120
acagttacca atgcttaatc agtgaggcac ctatctcagc gatctgtcta tttcgttcat 3180
ccatagttgc ctgactcccc gtcgtgtaga taactacgat acgggagggc ttaccatctg 3240
gccccagtgc tgcaatgata ccgcgagacc cacgctcacc ggctccagat ttatcagcaa 3300
taaaccagcc agccggaagg gccgagcgca gaagtggtcc tgcaacttta tccgcctcca 3360
tccagtctat taattgttgc cgggaagcta gagtaagtag ttcgccagtt aatagtttgc 3420
gcaacgttgt tggcattgct acaggcatcg tggtgtcacg ctcgtcgttt ggtatggctt 3480
cattcagctc cggttcccaa cgatcaaggc gagttacatg atcccccatg ttgtgcaaaa 3540
aagcggttag ctccttcggt cctccgatcg ttgtcagaag taagttggcc gcagtgttat 3600
cactcatggt tatggcagca ctgcataatt ctcttactgt catgccatcc gtaagatgct 3660
tttctgtgac tggtgagtac tcaaccaagt cattctgaga ataccgcgcc cggcgaccga 3720
gttgctcttg cccggcgtca atacgggata atagtgtatg acatagcaga actttaaaag 3780
tgctcatcat tggaaaacgt tcttcggggc gaaaactctc aaggatctta ccgctgttga 3840
gatccagttc gatgtaaccc actcgtgcac ccaactgatc ttcagcatct tttactttca 3900
ccagcgtttc tgggtgagca aaaacaggaa ggcaaaatgc cgcaaaaaag gaataagggg 3960
cgacacggaa atgttgaata ctcatactct tcctttttca atattattga agcatttatc 4020
agggttattg tctcatgagc ggatacatat ttgaatgtat ttagaaaaat aaacaaatag 4080
gggttccgcg cacatttccc cgaaaagtgc cacctgtatg cggtgtgaaa taccgcacag 4140
atgcgtaagg agaaaatacc gcatcaggcg aaattgtaaa cgttaatatt ttgttaaaat 4200
tcgcgttaaa tatttgttaa atcagctcat tttttaacca ataggccgaa atcggcaaaa 4260
tcccttataa atcaaaagaa tagaccgaga tagggttgag tgttgttcca gtttggaaca 4320
agagtccact attaaagaac gtggactcca acgtcaaagg gcgaaaaacc gtctatcagg 4380
gcgatggccc actacgtgaa ccatcaccca atcaagtttt ttgcggtcg aggtgccgta 4440
aagctctaaa tcggaaccct aaagggagcc cccgatttag agcttgacgg ggaaagccgg 4500
cgaacgtggc gagaaaggaa gggaagaaag cgaaaggagc gggcgctagg gcgctggcaa 4560
gtgtagcggt cacgctgcgc gtaaccacca cacccgccgc gcttaa                 4606
```

```
<210> 28
<211> 5399
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:plasmid

<400> 28
tgcgccgcta cagggcgcgt ccattcgcca ttcaggctgc gcaactgttg ggaagggcga 60
tcggtgcggg cctcttcgct attacgccag tttgggggtg agttcatgaa gtttcgtcgc 120
agcggcagat tggtggactt aacaaattat ttgttaaccc atccgcacga gttaataccg 180
ctaacctttt tctctgagcg gtatgaatct gcaaaatcat cgatcagtga agatttaaca 240
attattaaac aaacctttga acagcagggg attggtactt tgcttactgt tcccggagct 300
gccggaggcg ttaaatatat tccgaaaatg aagcaggctg aagctgaaga gtttgtgcag 360
acacttggac agtcgctggc aaatcctgag cgtatccttc cgggcggtta tgtatattta 420
acggatatct taggaaagcc atctgtactc tccaggtag ggaagctgtt tgcttccgtg 480
tttgcagagc gcgaaattga tgttgtcatg accgttgcca cgaaaggcat ccctcttgcg 540
tacgcagctg cggccgcgtc gacaaaccca gtgaaccatt tgaggtgata ggtaagatta 600
taccgaggta tgaaaacgag aattggacct ttacagaatt actctatgaa gcgccatatt 660
taaaaagcta ccaagacgaa gaggatgaag aggatgagga ggcagattgc cttgaatata 720
ttgacaatac tgataagata atatatcttt tatatagaag atatcgccgt atgtaaggat 780
ttcaggggc aaggcatagg cagcgcgctt atcaatatat ctatagaatg ggcaaagcat 840
aaaaacttgc atggactaat gcttgaaacc caggacaata accttatagc ttgtaaattc 900
tatcataatt gtggtttcaa aatcggctcc gtcgatacta gttatacgc caactttcaa 960
aacaactttg aaaaagctgt tttctggtat ttaaggtttt agaatgcaag gaacagtgaa 1020
ttggagttcg tcttgttata attagcttct ggggtatct ttaaatactg tagaaagag 1080
```

```
gaaggaaata ataaatggct aaaatgagaa tatcaccgga attgaaaaaa ctgatcgaaa 1140
aataccgctg cgtaaaagat acggaaggaa tgtctcctgc taaggtatat aagctggtgg 1200
gagaaaatga aaacctatat ttaaaaatga cggacagccg gtataaaggg accacctatg 1260
atgtggaacg ggaaaaggac atgatgctat ggctggaagg aaagctgcct gttccaaagg 1320
tcctgcactt tgaacggcat gatggctgga gcaatctgct catgagtgag gccgatggcg 1380
tcctttgctc ggaagagtat gaagatgaac aaagccctga aaagattatc gagctgtatg 1440
cggagtgcat caggctcttt cactccatcg acatatcgga ttgtccctat acgaatagct 1500
tagacagccg cttagccgaa ttggattact tactgaataa cgatctggcc gatgtggatt 1560
gcgaaaactg ggaagaagac actccattta aagatccgcg cgagctgtat gatttttaa 1620
agacggaaaa gcccgaagag gaacttgtct tttcccacgg cgacctggga gacagcaaca 1680
tctttgtgaa agatggcaaa gtaagtggct ttattgatct tgggagaagc ggcagggcgg 1740
acaagtggta tgacattgcc ttctgcgtcc ggtcgatcag ggaggatatc ggggaagaac 1800
agtatgtcga gctatttttt gacttactgg ggatcaagcc tgattgggag aaaataaaat 1860
attatatttt actggatgaa ttgttttagt acctagattt agatgtctaa aaagctttaa 1920
ctacaagctt tttagacatc taatctttc tgaagtacat ccgcaactgt ccatactctg 1980
atgttttata tcttttctaa aagttcgcta gataggggtc ccgagcgcct acgaggaatt 2040
tgtatcacca ggtaccagct gcaagctatt tgaatgtgcc tgttgtgatc gttcgtaaag 2100
acaataaggt aacagagggc tccacagtca gcattaatta cgtttcaggc tcctcaaacc 2160
gcattcaaac aatgtcactt gcgaaaagaa gcatgaaaac gggttcaaac gtactcatta 2220
ttgatgactt tatgaaagca ggcggcacca ttaatggtat gattaacctg ttggatgagt 2280
ttaacgcaaa tgtggcggga atcggcgtct tagttgaagc cgaaggagta gatgaacgtc 2340
ttgttgacga atatatgtca cttcttactc tttcaaccat caacatgaaa gagaagtcca 2400
ttgaaattca gaatggcaat tttctgcgtt tttttaaaga caatcttta aagaatggag 2460
agacagaatc atgacaaaag cagtccacac aaaacatgcc ccagcggcaa tcgggcctta 2520
ttcacaaggg attatcgtca acaatatgtt ttacagctca ggccaaatcc ctttgactcc 2580
ttcaggcgaa atggtgaatg gcgatattaa ggagcagact catcaagtat tcagcaattt 2640
aaaggcggtt ctggaagaag cgggtgcttc ttttgaaaca gttgtaaaag caactgtatt 2700
tatcgcggat atggaacagt ttgcggaagt aaacgaagtg tacggacaat attttgacac 2760
tcacaaaccg gcgagatctt gtgttgaagt cgcgagactc ccgaaggatg cgttagtcga 2820
gatcgaagtt attgcactgg tgaaataata agaaaagtaa ttctgggaga gccgggatca 2880
ctttttttatt taccttatgc ccgaaatgaa agctttatga ccctgcatta atgaatcggc 2940
caacgcgcgg ggagaggcgg tttgcgtatt gggcgctctt ccgcttcctc gctcactgac 3000
tcgctgcgct cggtcgttcg ctgcggcga gcggtatcag ctcactcaaa ggcggtaata 3060
cggttatcca cagaatcagg ggataacgca ggaaagaaca tgtgagcaaa aggccagcaa 3120
aaggccagga accgtaaaaa ggccgcgttg ctggcgtttt tcgataggct ccgcccccct 3180
gacgagcatc acaaaaatcg acgctcaagt cagaggtggc gaaacccgac aggactataa 3240
agataccagg cgtttccccc tggaagctcc ctcgtgcgct ctcctgttcc gaccctgccg 3300
cttaccggat acctgtccgc ctttctccct tcgggaagcg tggcgctttc tcatagctca 3360
cgctgtaggt atctcagttc ggtgtaggtc gttcgctcca agctgggctg tgtgcacgaa 3420
ccccccgttc agcccgaccg ctgcgcctta tccggtaact atcgtcttga gtccaacccg 3480
gtaagacacg acttatcgcc actggcagca gccactggta acaggattag cagagcgagg 3540
tatgtaggcg gtgctacaga gttcttgaag tggtggccta actacggcta cactagaagg 3600
acagtatttg gtatctgcgc tctgctgaag ccagttacct tcggaaaaag agttggtagc 3660
tcttgatccg gcaaacaaac caccgctggt agcggtggtt ttttgtttg caagcagcag 3720
attacgcgca gaaaaaaagg atctcaagaa gatcctttga tcttttctac ggggtctgac 3780
gctcagtgga acgaaaactc acgttaaggg attttggtca tgagattatc aaaaaggatc 3840
ttcacctaga tccttttaaa ttaaaaatga agttttaaat caatctaaag tatatatgag 3900
taaacttggt ctgacagtta ccaatgctta atcagtgagg cacctatctc agcgatctgt 3960
ctatttcgtt catccatagt tgcctgactc cccgtcgtgt agataactac gatacgggag 4020
ggcttaccat ctggccccag tgctgcaatg ataccgcgag acccacgctc accggctcca 4080
gatttatcag caataaacca gccagccgga agggccgagc gcagaagtgg tcctgcaact 4140
ttatccgcct ccatccagtc tattaattgt tgccgggaag ctagagtaag tagttcgcca 4200
gttaatagtt tgcgcaacgt tgttggcatt gctacaggca tcgtggtgtc acgctcgtcg 4260
tttggtatgg cttcattcag ctccggttcc caacgatcaa ggcgagttac atgatccccc 4320
atgttgtgca aaaaagcggt tagctccttc ggtcctccga tcgttgtcag aagtaagttg 4380
gccgcagtgt tatcactcat ggttatggca gcactgcata attctcttac tgtcatgcca 4440
tccgtaagat gcttttctgt gactggtgag tactcaacca agtcattctg agaataccgc 4500
gcccggcgac cgagttgctc ttgcccggcg tcaatacggg ataatagtgt atgacatagc 4560
agaactttaa aagtgctcat cattggaaaa cgttcttcgg ggcgaaaact ctcaaggatc 4620
```

```
ttaccgctgt tgagatccag ttcgatgtaa cccactcgtg cacccaactg atcttcagca 4680
tcttttactt tcaccagcgt ttctgggtga gcaaaaacag gaaggcaaaa tgccgcaaaa 4740
aagggaataa gggcgacacg gaaatgttga atactcatac tcttcctttt tcaatattat 4800
tgaagcattt atcaggggtta ttgtctcatg agcggataca tatttgaatg tatttagaaa 4860
aataaacaaa tagggggttcc gcgcacattt ccccgaaaag tgccacctgt atgcggtgtg 4920
aaataccgca cagatgcgta aggagaaaat accgcatcag gcgaaattgt aaacgttaat 4980
attttgttaa aattcgcgtt aaatatttgt taaatcagct cattttttaa ccaataggcc 5040
gaaatcggca aaatccctta taaatcaaaa gaatagaccg agatagggtt gagtgttgtt 5100
ccagtttgga acaagagtcc actattaaag aacgtggact ccaacgtcaa agggcgaaaa 5160
accgtctatc agggcgatgg cccactacgt gaaccatcac ccaaatcaag tttttttgcgg 5220
tcgaggtgcc gtaaagctct aaatcggaac cctaaaggga gcccccgatt tagagcttga 5280
cggggaaagc cggcgaacgt ggcgagaaag gaagggaaga aagcgaaagg agcgggcgct 5340
agggcgctgg caagtgtagc ggtcacgctg cgcgtaacca ccacacccgc cgcgcttaa  5399
```

<210> 29
<211> 6805
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:plasmid

<400> 29
```
ttgcggccgc ttcgaaagct gtaatataaa aaccttcttc aactaacggg gcaggttagt 60
gacattagaa aaccgactgt aaaaagtaca gtcggcatta tctcatatta taaaagccag 120
tcattaggcc tatctgacaa ttcctgaata gagttcataa acaatcctgc atgataacca 180
tcacaaacag aatgatgtac ctgtaaagat agcggtaaat atattgaatt accttttatta 240
atgaattttc ctgctgtaat aatgggtaga aggtaattac tattattatt gatatttaag 300
ttaaacccag taaatgaagt ccatggaata atagaaagag aaaaagcatt ttcaggtata 360
ggtgtttttgg gaaacaattt ccccgaacca ttatatttct ctacatcaga aaggtataaa 420
tcataaaact ctttgaagtc attctttaca ggagtccaaa taccagagaa tgtttagat 480
acaccatcaa aaattgtata aagtggctct aacttatccc aataacctaa ctctccgtcg 540
ctattgtaac cagttctaaa agctgtattt gagtttatca cccttgtcac taagaaaata 600
aatgcagggt aaaatttata tccttcttgt tttatgtttc ggtataaaac actaatatca 660
atttctgtgg ttatactaaa agtcgtttgt tggttcaaat aatgattaaa tatctctttt 720
ctcttccaat tgtctaaatc aatttttatta aagttcattt gatatgcctc ctaaattttt 780
atctaaagtg aatttaggag cttacttgt ctgctttctt cattagaatc aatcctttttt 840
taaaagtcaa tattactgta acataaatat atattttaaa aatatcccac tttatccaat 900
tttcgtttgt tgaactaatg ggtgctttag ttgaagaata aagaccacat taaaaaatgt 960
ggtcttttgt gttttttttaa aggatttgag cgtagcgaaa aatccttttc tttcttatct 1020
tgataataag ggtaactatt gaattcggta ccaagagttt gtagaaacgc aaaaaggcca 1080
tccgtcagga tggccttctg cttaatttga tgcctggcag tttatggcgg gcgtcctgcc 1140
cgccaccctc cgggccgttg cttcgcaacg ttcaaatccg ctcccggcgg atttgtccta 1200
ctcaggagag cgttcaccga caaacaacag ataaaacgaa aggcccagtc tttcgactga 1260
gcctttcgtt ttatttgatg cctggcagtt ccctactctc gcatggggag accccacact 1320
accatcggcg ctacggcgtt tcacttctga gttcggcatg gggtcaggtg ggaccaccgc 1380
gctactgccg ccaggcaaat tctgttttat cagaccgctt ctgcgttctg atttaatctg 1440
tatcaggctg aaaatcttct ctcatccgcc aaaacaggat ccaattatgg cagatcaatg 1500
agcttcacag acacaatatc agggacattt gttagttctt tcacaatttt atcttccaga 1560
tgtctgtcaa aggaaagcat catgatggct tctccgcctt tttccttacg gccaacctgc 1620
atagttgcaa tgttaatatc attatctccg agaatacgtc ctactcggcc gatgacacct 1680
gttgtatctt gatgctggat atacaccaag tgaccagtcg gataaaaatc aatattaaat 1740
ccattgatct cgacaattcg ttctccgaaa tgaggaatat acgtagccgt tacagtaaag 1800
gtgctgcggt ctcctgtcac ttttacgctg atgcagttat cgtatccaga ttcagaagag 1860
gaaatttttt cactgaagct aatgccgcgt tcttttgcga cacccccggc attgacctca 1920
ttaacagtag agtctacgcg cggtttttaaa aagcctgaca gaagggcttt tgtaatgaac 1980
gatgtttcaa gtttagcaat tgtgccttca tattgaatgg caacatcctg tactggttct 2040
ttcatgcact gtgatacaag gctgccaatt tttcctgcaa tttgatggta aggcttaatt 2100
ttagcaaatt catctttgt catggcaggc aggttgatag ctgacatgac aggcaggcct 2160
```

```
tttgcgaact gcagaacttc ttctgacact tgggcggcga cattgagctg tgcttctttc 2220
gttgatgctc ccaagtgagg agtggcaatg actaatggat gatcaacaag tttgttgtca 2280
actggcggtt cgacttcgaa aacgtcaagc gctgctcccg caacatgccc gttttccaaa 2340
gcttcgagaa gtgctgcttc atcgataatt ccgcctcgcg cacagttaat taagcgaacg 2400
cctttttttcg tttttgcaat cgtttctttta ttcaataagc ctttttgtttc ttttgttaaa 2460
ggcgtgtgaa cggtaatgat atccgcadtt tcaagcactt cttcaaatgt acggctgttt 2520
acgccgattt ttttcgctct ttcttccgtt aagaaaggat caaaaacgtg cacagtcata 2580
ccgaacgctc ctcgacgctg tgcaatttca cttccgattc ggcctaatcc tacaatacca 2640
agcgtttttc cataaagctc tgaaccgaca taagctgtgc ggttccactc tctggatttc 2700
actgagatat tagcctgcgg aatgtgtctc attaaagaag agatcattgc aaatgtatgc 2760
tcagctgtcg aaatggtgtt gccgttcgga gcattgatca cgattacccc gtgtttcgta 2820
gcctcatcaa tatcgatatt atcgacaccg acaccggctc ttccgacaat ttttaaagaa 2880
gtcattttgt tgaaaaggtc ttctgttact tttgtcgcgc ttcgcaccaa aagagcatca 2940
aaagtatgta attcatcttc tgcatctgct acgttttttt gaacgatttc aataaagtct 3000
gattcaataa gtggctgtaa accgtcgttg ctcattttgt ctgagaccaa tactcgaaac 3060
atgttttctc ctcctctaga gcgtcctgct gttgttaaga ttattatacc acaccttgta 3120
gataaagtca acaacttttt gcaaaatttt tcaggaattt tagcagaggt tgttctggat 3180
gtagaacaaa acatctttcc gctcttgtgc tgttaggata tctttcttgg aagctaggta 3240
ggcctcgagt tatggcagtt ggttaaaagg aaacaaaaag accgttttca cacaaaacgg 3300
tcttttttcga tttcttttta cagtcacagc cacttttgca aaaaccggac agcttcatgc 3360
cttataactg ctgtttcggt cgacctgcag gcatgcaagc ttcgcgaagc ggccgccgac 3420
gcgaggctgg atggccttcc ccattatgat tcttctcgct tccggcggca tcgggatgcc 3480
cgcgttgcag gccatgctgt ccaggcaggt agatgacgac catcaggac agcttcaagg 3540
atcgctcgcg gctcttacca gcctaacttc gatcactgga ccgctgatcg tcacggcgat 3600
ttatgccgcc tcggcgagca catggaacgg gttggcatgg attgtaggcg ccgccctata 3660
ccttgtctgc ctccccgcgt tgcgtcgcgg tgcatggagc cgggccacct cgacctgaat 3720
ggaagccggc ggcacctcgc taacggattc accactccaa gaattggagc caatcaattc 3780
ttgcggagaa ctgtgaatgc gcaaaccaac ccttggcaga acatatccat cgcgtccgcc 3840
atctccagca gccgcacgcg gcgcatctcg ggcagcgttg ggtcctggcc acgggtgcgc 3900
atgatcgtgc tcctgtcgtt gaggacccgg ctaggctggc ggggttgcct tactggttag 3960
cagaatgaat caccgatacg cgagcgaacg tgaagcgact gctgctgcaa aacgtctgcg 4020
acctgagcaa caacatgaat ggtcttcggt ttccgtgttt cgtaaagtct ggaaacgcgg 4080
aagtcagcgc cctgcaccat tatgttccgg atctgcatcg caggatgctg ctggctaccc 4140
tgtggaacac ctacatctgt attaacgaag cgctggcatt gaccctgagt gatttttctc 4200
tggtcccgcc gcatccatac cgccagttgt ttaccctcac aacgttccag taaccgggca 4260
tgttcatcat cagtaacccg tatcgtgagc atcctctctc gtttcatcgg tatcattacc 4320
cccatgaaca gaaattcccc cttacacgga ggcatcaagt gaccaaacag gaaaaaaccg 4380
cccttaacat ggcccgcttt atcagaagcc agacattaac gcttctggag aaactcaacg 4440
agctggacgc ggatgaacag gcagacatct gtgaatcgct tcacgaccac gctgatgagc 4500
tttaccgcag ctgcctcgcg cgtttcggtg atgacggtga aaacctctga cacatgcagc 4560
tcccggagac ggtcacagct tgtctgtaag cggatgccgg gagcagacaa gcccgtcagg 4620
gcgcgtcagc gggtgttggc gggtgtcggg gcgcagccat gacccagtca cgtagcgata 4680
gcggagtgta tactggctta actatgcggc atcagagcag attgtactga gagtgcacca 4740
tatgcggtgt gaaataccgc acagatgcgt aaggagaaaa taccgcatca ggcgctcttc 4800
cgcttcctcg ctcactgact cgctgcgctc ggtcgttcgg ctgcggcgag cggtatcagc 4860
tcactcaaag cggtaatac ggttatccac agaatcaggg gataacgcag gaaagaacat 4920
gtgagcaaaa ggccagcaaa aggccaggaa ccgtaaaaag ccgcgttgc tggcgttttt 4980
ccataggctc cgcccccctg acgagcatca caaaaatcga cgctcaagtc agaggtggcg 5040
aaacccgaca ggactataaa gataccaggc gtttccccct ggaagctccc tcgtgcgctc 5100
tcctgttccg accctgccgc ttaccggata cctgtccgcc tttctccctt cgggaagcgt 5160
ggcgctttct catagctcac gctgtaggta tctcagttcg gtgtaggtcg ttcgctccaa 5220
gctgggctgt gtgcacgaac ccccgttca gcccgaccgc tgcgccttat ccggtaacta 5280
tcgtcttgag tccaacccgg taagacacga cttatcgcca ctggcagcag ccactggtaa 5340
caggattagc agagcgaggt atgtaggcgg tgctacagag ttcttgaagt ggtggcctaa 5400
ctacggctac actagaagga cagtatttgg tatctgcgct ctgctgaagc cagttacctt 5460
cggaaaaaga gttggtagct cttgatccgg caaacaaacc accgctggta gcggtggttt 5520
ttttgtttgc aagcagcaga ttacgcgcag aaaaaaagga tctcaagaag atcctttgat 5580
cttttctacg gggtctgacg ctcagtggaa cgaaaactca cgttaaggga ttttggtcat 5640
gagattatca aaaaggatct tcacctagat ccttttaaat taaaaatgaa gttttaaatc 5700
```

```
aatctaaagt atatatgagt aaacttggtc tgacagttac caatgcttaa tcagtgaggc 5760
acctatctca gcgatctgtc tatttcgttc atccatagtt gcctgactcc ccgtcgtgta 5820
gataactacg atacgggagg gcttaccatc tggccccagt gctgcaatga taccgcgaga 5880
cccacgctca ccggctccag atttatcagc aataaaccag ccagccggaa gggccgagcg 5940
cagaagtggt cctgcaactt tatccgcctc catccagtct attaattgtt gccgggaagc 6000
tagagtaagt agttcgccag ttaatagttt gcgcaacgtt gttgccattg ctgcaggcat 6060
cgtggtgtca cgctcgtcgt ttggtatggc ttcattcagc tccggttccc aacgatcaag 6120
gcgagttaca tgatccccca tgttgtgcaa aaaagcggtt agctccttcg gtcctccgat 6180
cgttgtcaga agtaagttgg ccgcagtgtt atcactcatg gttatggcag cactgcataa 6240
ttctcttact gtcatgccat ccgtaagatg cttttctgtg actggtgagt actcaaccaa 6300
gtcattctga gaatagtgta tgcggcgacc gagttgctct tgcccggcgt caatacggga 6360
taataccgcg ccacatagca gaactttaaa agtgctcatc attggaaaac gttcttcggg 6420
gcgaaaactc tcaaggatct taccgctgtt gagatccagt tcgatgtaac ccactcgtgc 6480
acccaactga tcttcagcat cttttacttt caccagcgtt tctgggtgag caaaaacagg 6540
aaggcaaaat gccgcaaaaa agggaataag ggcgacacgg aaatgttgaa tactcatact 6600
cttccttttt caatattatt gaagcattta tcagggttat tgtctcatga gcggatacat 6660
atttgaatgt atttagaaaa ataaacaaat aggggttccg cgcacatttc cccgaaaagt 6720
gccacctgac gtctaagaaa ccattattat catgacatta acctataaaa ataggcgtat 6780
cacgaggccc tttcgtcttc aagaa                                        6805
```

```
<210> 30
<211> 5983
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:plasmid

<400> 30
tgcgccgcta cagggcgcgt ccattcgcca ttcaggctgc gcaactgttg ggaagggcga 60
tcggtgcggg cctcttcgct attacgccag ctggcgaaag ggggatgtgc tgcaaggcga 120
ttaagttggg taacgccagg gttttcccag tcacgacgtt gtaaaacgac ggccagtgaa 180
ttgtaatacg actcactata gggcgaattg ggcccgacgt cgcatgctcc cggccgccat 240
ggccgcggga tatcactagt gcggccgcct gcaggtcgac catatgggag agcccggatc 300
caattatggc agatcaatga gcttcacaga cacaatatca gggacatttg ttagttcttt 360
cacaatttta tcttccagat gtctgtcaaa ggaaagcatc atgatggctt ctccgccttt 420
ttccttacgg ccaacctgca tagttgcaat gttaatatca ttatctccga gaatacgtcc 480
tactcggccg atgacacctg ttgtatcttg atgctggata tacaccaagt gaccagtcgg 540
ataaaaatca atattaaatc cattgatctc gacaattcgt tctccgaaat gaggaatata 600
cgtagccgtt acagtaaagg tgctgcggtc tcctgtcact tttacgctga tgcagttatc 660
gtatccagat tcagaagagg aaattttttc actgaagcta atgccgcgtt ctttttgcgac 720
acccccggca ttgacctcat taacagtaga gtctacgcgc ggttttaaaa agcctgacag 780
aagggctttt gtaatgaacg atgtttcaag tttagcaatt gtgccttcat attgaatggc 840
aacatcctgt actggttctt tcatgcactg tgatacaagg ctgccaattt ttcctgcaat 900
ttgatggtaa ggcttaattt tagcaaattc atcttttgtc atggcaggca ggttgatagc 960
tgacatgaca ggcaggcctt ttgcgaactg cagaacttct tctgacactt gggcggcgac 1020
attgagctgt gcttctttcg ttgatgctcc caagtgagga gtggcaatga ctaatggatg 1080
atcaacaagt ttgttgtcaa ctggcggttc gacttcgaaa acgtcaagcg ctgctcccgc 1140
aacatgcccg ttttccaaag cttttttagac atctaaatct aggtactaaa acaattcatc 1200
cagtaaaata taatatttta ttttctccca atcaggcttg atccccagta agtcaaaaaa 1260
tagctcgaca tactgttctt ccccgatatc ctccctgatc gaccggacgc agaaggcaat 1320
gtcataccac ttgtccgccc tgccgcttct cccaagatca ataaagccac ttactttgcc 1380
atctttcaca aagatgttgc tgtctcccag gtcgccgtgg gaaaagacaa gttcctcttc 1440
gggcttttcc gtctttaaaa aatcatacag ctcgcgcgga tctttaaatg gagtgtcttc 1500
ttcccagttt tcgcaatcca catcggccag atcgttattc agtaagtaat ccaattcggc 1560
taagcggctg tctaagctat tcgtataggg acaatccgat atgtcgatgg agtgaaagag 1620
cctgatgcac tccgcataca gctcgataat cttttcaggg ctttgttcat cttcatactc 1680
ttccgagcaa aggacgccat cggcctcact catgagcaga ttgctccagc catcatgccg 1740
ttcaaagtgc aggacctttg gaacaggcag ctttccttcc agccatagca tcatgtcctt 1800
```

```
ttcccgttcc acatcatagg tggtcccttt ataccggctg tccgtcattt ttaaatatag 1860
gttttcattt tctcccacca gcttatatac cttagcagga gacattcctt ccgtatcttt 1920
tacgcagcgg tattttttcga tcagtttttt caattccggt gatattctca tttttagccat 1980
ttattatttc cttcctcttt tctacagtat ttaaagatac cccaagaagc taattataac 2040
aagacgaact ccaattcact gttccttgca ttctaaaacc ttaaatacca gaaaacagct 2100
ttttcaaagt tgttttgaaa gttggcgtat aacatagtat cgacggagcc gattttgaaa 2160
ccacaattat gatagaattt acaagctata aggttattgt cctgggtttc aagcattagt 2220
ccatgcaagt ttttatgctt tgcccattct atagatatat tgataagcgc gctgcctatg 2280
ccttgccccc tgaaatcctt acatacggcg atatcttcta tataaaagat atattatctt 2340
atcagtattg tcaatatatt caaggcaatc tgcctcctca tcctcttcat cctcttcgtc 2400
ttggtagctt tttaaatatg gcgcttcata gagtaattct gtaaaggtcc aattctcgtt 2460
ttcatacctc ggtataatct tacctatcac ctcaaatggt tcgctgggtt tatcgcctga 2520
tgcggtattt tctccttacg catctgtgcg gtatttcacg tcgacgcggc cgccatggcc 2580
gcgggatccc ggtaccgaaa catcgttaga tttcctccta aattgacaaa ctaaatatct 2640
gataatttaa catattctca aaagagtgtc aacgtgtatt gacgcagtaa aggataaaag 2700
taaagcctaa taaatcaatg atctgacagc ttgcaggtaa tatatttaat ttgaagcaat 2760
tctctataca gccaaccagt tatcgtttat aatgtaatta aatttcatat gatcaatctt 2820
cggggcaggg tgaaattccc taccggcggt gatgagccaa tggctctaag cccgcgagct 2880
gtctttacag caggattcgg tgagattccg gagccgacag tacagtctgg atgggagaag 2940
atggaggttc ataagcgttt tgaaattgaa ttttttcaaac gtttctttgc ctagcctaat 3000
tttcgaaacc ccgctttttat atatgaagcg gttttttttat tggctggaaa agaacctttc 3060
cgttttcgag taagatgtga tcgaaaagga gagaatgaag tgaaagtaaa aaaattagtt 3120
gtggtcagca tgctgagcag cattgcattt gttttgatgc tgttaaattt cccgtttccg 3180
ggtcttccgg attatttaaa aatcgatttt agcgacgttc ccgcaattat tgccattctg 3240
atttacggac ctttggcggg atcactagag ggctcccaac gcgttggatg catagcttga 3300
gtattctata gtgtcaccta aatagcttgg cgtaatcatg gtcatagctg tttcctgtgt 3360
gaaattgtta tccgctcaca attccacaca acatacgagc cggaagcata aagtgtaaag 3420
cctggggtgc ctaatgagtg agctaactca cattaattgc gttgcgctca ctgcccgctt 3480
tccagtcggg aaacctgtcg tgccagctgc attaatgaat cggccaacgc gcggggagag 3540
gcggtttgcg tattgggcgc tcttccgctt cctcgctcac tgactcgctg cgctcggtcg 3600
ttcggctgcg gcgagcggta tcagctcact caaaggcggt aatacggtta tccacagaat 3660
caggggataa cgcaggaaag aacatgtgag caaaaggcca gcaaaaggcc aggaaccgta 3720
aaaaggccgc gttgctggcg tttttcgata ggctccgccc ccctgacgag catcacaaaa 3780
atcgacgctc aagtcagagg tggcgaaacc cgacaggact ataaagatac caggcgtttc 3840
cccctggaag ctccctcgtg cgctctcctg ttccgaccct gccgcttacc ggatacctgt 3900
ccgcctttct cccttcggga agcgtggcgc tttctcatag ctcacgctgt aggtatctca 3960
gttcggtgta ggtcgttcgc tccaagctgg gctgtgtgca cgaacccccc gttcagcccg 4020
accgctgcgc cttatccggt aactatcgtc ttgagtccaa cccggtaaga cacgacttat 4080
cgccactggc agcagccact ggtaacagga ttagcagagc gaggtatgta ggcggtgcta 4140
cagagttctt gaagtggtgg cctaactacg gctacactag aaggacagta tttggtatct 4200
gcgctctgct gaagccagtt accttcggaa aaagagttgg tagctcttga tccggcaaac 4260
aaaccaccgc tggtagcggt ggtttttttg tttgcaagca gcagattacg cgcagaaaaa 4320
aaggatctca agaagatcct ttgatctttt ctacggggtc tgacgctcag tggaacgaaa 4380
actcacgtta agggattttg gtcatgagat tatcaaaaag gatcttcacc tagatccttt 4440
taaattaaaa atgaagtttt aaatcaatct aaagtatata tgagtaaact tggtctgaca 4500
gttaccaatg cttaatcagt gaggcaccta tctcagcgat ctgtctattt cgttcatcca 4560
tagttgcctg actccccgtc gtgtagataa ctacgatacg gagggcttac catctggcc 4620
ccagtgctgc aatgataccg cgagacccac gctcaccggc tccagattta tcagcaataa 4680
accagccagc cggaagggcc gagcgcagaa gtggtcctgc aactttatcc gcctccatcc 4740
agtctattaa ttgttgccgg gaagctagag taagtagttc gccagttaat agtttgcgca 4800
acgttgttgg cattgctaca ggcatcgtgg tgtcacgctc gtcgtttggt atggcttcat 4860
tcagctccgg ttcccaacga tcaaggcgag ttacatgatc ccccatgttg tgcaaaaaag 4920
cggttagctc cttcggtcct ccgatcgttg tcagaagtaa gttggccgca gtgttatcac 4980
tcatggttat ggcagcactg cataattctc ttactgtcat gccatccgta agatgctttt 5040
ctgtgactgg tgagtactca accaagtcat tctgagaata ccgcgcccgg cgaccgagtt 5100
gctcttgccc ggcgtcaata cgggataata gtgtatgaca tagcagaact ttaaaagtgc 5160
tcatcattgg aaaacgttct tcggggcgaa aactctcaag gatcttaccg ctgttgagat 5220
ccagttcgat gtaacccact cgtgcaccca actgatcttc agcatctttt actttcacca 5280
gcgtttctgg gtgagcaaaa acaggaaggc aaaatgccgc aaaaaaggga ataagggcga 5340
```

```
cacggaaatg ttgaatactc atactcttcc tttttcaata ttattgaagc atttatcagg 5400
gttattgtct catgagcgga tacatatttg aatgtatttta gaaaaataaa caaatagggg 5460
ttccgcgcac atttcccga aaagtgccac ctgtatgcgg tgtgaaatac cgcacagatg 5520
cgtaaggaga aaataccgca tcaggcgaaa ttgtaaacgt taatattttg ttaaaattcg 5580
cgttaaatat ttgttaaatc agctcatttt ttaaccaata ggccgaaatc ggcaaaatcc 5640
cttataaatc aaaagaatag accgagatag ggttgagtgt tgttccagtt tggaacaaga 5700
gtccactatt aaagaacgtg gactccaacg tcaaagggcg aaaaaccgtc tatcaggcg 5760
atggcccact acgtgaacca tcacccaaat caagtttttt gcggtcgagg tgccgtaaag 5820
ctctaaatcg gaaccctaaa gggagccccc gatttagagc ttgacgggga aagccggcga 5880
acgtggcgag aaaggaaggg aagaaagcga aaggagcggg cgctagggcg ctggcaagtg 5940
tagcggtcac gctgcgcgta accaccacac ccgccgcgct taa                   5983
```

<210> 31
<211> 7330
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:plasmid

<400> 31
```
ttgcggccgc ttcgaaagct gtaatataaa aaccttcttc aactaacggg gcaggttagt 60
gacattagaa aaccgactgt aaaaagtaca gtcggcatta tctcatatta taaaagccag 120
tcattaggcc tatctgacaa ttcctgaata gagttcataa acaatcctgc atgataacca 180
tcacaaacag aatgatgtac ctgtaaagat agcggtaaat atattgaatt acctttatta 240
atgaattttc ctgctgtaat aatgggtaga aggtaattac tattattatt gatatttaag 300
ttaaacccag taaatgaagt ccatggaata atagaaagag aaaaagcatt ttcaggtata 360
ggtgtttttgg gaaacaattt ccccgaacca ttatatttct ctacatcaga aaggtataaa 420
tcataaaact ctttgaagtc attctttaca ggagtccaaa taccagagaa tgtttttagat 480
acaccatcaa aaattgtata aagtggctct aacttatccc aataacctaa ctctccgtcg 540
ctattgtaac cagttctaaa agctgtattt gagtttatca cccttgtcac taagaaaata 600
aatgcagggt aaaatttata tccttcttgt tttatgtttc ggtataaaac actaatatca 660
atttctgtgg ttatactaaa agtcgtttgt tggttcaaat aatgattaaa tatctcttttt 720
ctcttccaat tgtctaaatc aattttatta aagttcattt gatatgcctc ctaaattttt 780
atctaaagtg aatttaggag gcttacttgt ctgctttctt cattagaatc aatcctttt 840
taaaagtcaa tattactgta acataaatat atattttaaa aatatcccac tttatccaat 900
tttcgtttgt tgaactaatg ggtgctttag ttgaagaata aagaccacat taaaaaatgt 960
ggtcttttgt gttttttttaa aggatttgag cgtagcgaaa aatccttttc tttcttatct 1020
tgataataag ggtaactatt gaattcggta ccaagagttt gtagaaacgc aaaaaggcca 1080
tccgtcagga tggccttctg cttaatttga tgcctggcag tttatggcgg gcgtcctgcc 1140
cgccaccctc cgggccgttg cttcgcaacg ttcaaatccg ctccccggcgg atttgtccta 1200
ctcaggagag cgttcaccga caaacaacag ataaaacgaa aggcccagtc tttcgactga 1260
gcctttcgtt ttatttgatg cctggcagtt ccctactctc gcatggggag accccacact 1320
accatcggcg ctacggcgtt tcacttctga gttcggcatg gggtcaggtg ggaccaccgc 1380
gctactgccg ccaggcaaat tctgttttat cagaccgctt ctgcgttctg atttaatctg 1440
tatcaggctg aaaatcttct ctcatccgcc aaaacaggat ccaattatgg cagatcaatg 1500
agcttcacag acacaatatc agggacattt gttagttctt tcacaatttt atcttccaga 1560
tgtctgtcaa aggaaagcat catgatggct tctccgcctt tttccttacg gccaacctgc 1620
atagttgcaa tgttaatatc attatctccg agaatacgtc ctactcggcc gatgacacct 1680
gttgtatctt gatgctggat atacaccaag tgaccagtcg gataaaaatc aatattaaat 1740
ccattgatct cgacaattcg ttctccgaaa tgaggaatat acgtagccgt tacagtaaag 1800
gtgctgcggt ctcctgtcac ttttacgctg atgcagttat cgtatccaga ttcagaagag 1860
gaaatttttt cactgaagct aatgccgcgt tcttttgcga caccccggc attgacctca 1920
ttaacagtag agtctacgcg cggtttttaaa aagcctgaca gaaggcgttt tgtaatgaac 1980
gatgtttcaa gtttagcaat tgtgccttca tattgaatgg caacatcctg tactggttct 2040
ttcatgcact gtgatacaag gctgccaatt tttcctgcaa tttgatggta aggcttaatt 2100
ttagcaaatt catctttttgt catggcaggc aggttgatag ctgacatgac aggcaggcct 2160
tttgcgaact gcagaacttc ttctgacact tgggcggcga cattgagctg tgcttcttttc 2220
gttgatgctc ccaagtgagg agtggcaatg actaatggat gatcaacaag tttgttgtca 2280
```

```
actggcggtt cgacttcgaa aacgtcaagc gctgctcccg caacatgccc gttttccaaa 2340
gcttcgagaa gtgctgcttc atcgataatt ccgcctcgcg cacagttaat taagcgaacg 2400
ccttttttcg ttttttgcaat cgtttcttta ttcaataagc cttttgtttc ttttgttaaa 2460
ggcgtgtgaa cggtaatgat atccgcactt tcaagcactt cttcaaatgt acggctgttt 2520
acgccgattt ttttcgctct ttcttccgtt aagaaaggat caaaaacgtg cacagtcata 2580
ccgaacgctc ctcgacgctg tgcaatttca cttccgattc ggcctaatcc tacaatacca 2640
agcgtttttc cataaagctc tgaaccgaca taagctgtgc ggttccactc tctggatttc 2700
actgagatat tagcctgcgg aatgtgtctc attaaagaag agatcattgc aaatgtatgc 2760
tcagctgtcg aaatggtgtt gccgttcgga gcattgatca cgattacccc gtgtttcgta 2820
gcctcatcaa tatcgatatt atcgacaccg acaccggctc ttccgacaat ttttaaagaa 2880
gtcattttgt tgaaaaggtc ttctgttact tttgtcgcgc ttcgcaccaa aagagcatca 2940
aaagtatgta attcatcttc tgcatctgct acgttttttt gaacgatttc aataaagtct 3000
gattcaataa gtggctgtaa accgtcgttg ctcattttgt ctgagaccaa tactcgaaac 3060
atgttttctc ctcctctaga gcgtcctgct gttgttaaga ttattatacc acaccttgta 3120
gataaagtca acaacttttt gcaaaatttt tcaggaattt tagcagaggt tgttctggat 3180
gtagaacaaa acatctttcc gctcttgtgc tgttaggata tctttcttgg aagctaggta 3240
ggcctcgagt tatggcagtt ggttaaaagg aaacaaaaag accgttttca cacaaaacgg 3300
tcttttcga tttctttta cagtcacagc cactttgca aaaaccggac agcttcatgc 3360
cttataactg ctgtttcggt cgacgaaaca tcgttagatt cctcctaaa ttgacaaact 3420
aaatatctga taatttaaca tattctcaaa agagtgtcaa cgtgtattga cgcagtaaag 3480
gataaaagta aagcctaata aatcaatgat ctgacagctt gcaggtaata tatttaattt 3540
gaagcaattc tctatacagc caaccagtta tcgtttataa tgtaattaaa tttcatatga 3600
tcaatcttcg gggcagggtg aaattcccta ccggcggtga tgagccaatg gctctaagcc 3660
cgcgagctgt cttacagca ggattcggtg agattccgga ccgacagta cagtctggat 3720
gggagaagat ggaggttcat aagcgttttg aaattgaatt tttcaaacgt ttctttgcct 3780
agcctaattt tcgaaacccc gcttttatat atgaagcggt tttttattg gctggaaaag 3840
aacctttccg ttttcgagta agatgtgatc gaaaaggaga gaatgaagtg aaagtaaaaa 3900
aattagttgt ggtcagcatg caagcttcgc gaagcggccg ccgacgcgag gctggatggc 3960
cttccccatt atgattcttc tcgcttccgg cggcatcggg atgcccgcgt tgcaggccat 4020
gctgtccagg caggtagatg acgaccatca gggacagctt caaggatcgc tcgcggctct 4080
taccagccta acttcgatca ctggaccgct gatcgtcacg gcgatttatg ccgcctcggc 4140
gagcacatgg aacgggttgg catggattgt aggcgccgacc ctataccttg tctgcctccc 4200
cgcgttgcgt cgcggtgcat ggagccgggc cacctcgacc tgaatggaag ccggcggcac 4260
ctcgctaacg gattcaccac tccaagaatt ggagccaatc aattcttgcg gagaactgtg 4320
aatgcgcaaa ccaacccttg gcagaacata tccatcgcgt ccgccatctc cagcagccgc 4380
acgcggcgca tctcgggcag cgttgggtcc tggccacggg tgcgcatgat cgtgctcctg 4440
tcgttgagga cccggctagg ctggcggggt tgccttactg gttagcagaa tgaatcaccg 4500
atacgcgagc gaacgtgaag cgactgctgc tgcaaaacgt ctgcgacctg agcaacaaca 4560
tgaatggtct tcggtttccg tgtttcgtaa agtctggaaa cgcggaagtc agcgccctgc 4620
accattatgt tccggatctg catcgcagga tgctgctggc taccctgtgg aacacctaca 4680
tctgtattaa cgaagcgctg gcattgaccc tgagtgattt ttctctggtc ccgccgcatc 4740
cataccgcca gttgtttacc ctcacaacgt tccagtaacc gggcatgttc atcatcagta 4800
accgtatcg tgagcatcct ctctcgtttc atcggtatca ttacccccat gaacagaaat 4860
tcccccttac acggaggcat caagtgacca aacaggaaaa aaccgccctt aacatggccc 4920
gctttatcag aagccagaca ttaacgcttc tggagaaact caacgagctg gacgcggatg 4980
aacaggcaga catctgtgaa tcgcttcacg accacgctga tgagctttac cgcagctgcc 5040
tcgcgcgttt cggtgatgac ggtgaaaacc tctgacacat gcagctcccg gagacggtca 5100
cagcttgtct gtaagcggat gccgggagca gacaagcccg tcaggcgcg tcagcgggtg 5160
ttggcgggtg tcgggcgca gccatgaccc agtcacgtag cgatagcgga gtgtatactg 5220
gcttaactat gcggcatcag agcagattgt actgagagtg caccatatgc ggtgtgaaat 5280
accgcacaga tgcgtaagga gaaaataccg catcaggcgc tcttccgctt cctcgctcac 5340
tgactcgctg cgctcggtcg ttcggctgcg gcgagcggta tcagctcact caaaggcggt 5400
aatacggtta tccacagaat caggggataa cgcaggaaag aacatgtgag caaaaggcca 5460
gcaaaaggcc aggaaccgta aaaaggccgc gttgctggcg ttttccata ggctccgccc 5520
ccctgacgag catcacaaaa atcgacgctc aagtcagagg tggcgaaacc cgacaggact 5580
ataaagatac caggcgtttc cccctggaag ctccctcgtg cgctctcctg ttccgaccct 5640
gccgcttacc ggatacctgt ccgcctttct cccttcggga agcgtggcgc tttctcatag 5700
ctcacgctgt aggtatctca gttcggtgta ggtcgttcgc tccaagctgg gctgtgtgca 5760
cgaacccccc gttcagcccg accgctgcgc cttatccggt aactatcgtc ttgagtccaa 5820
```

```
cccggtaaga cacgacttat cgccactggc agcagccact ggtaacagga ttagcagagc 5880
gaggtatgta ggcggtgcta cagagttctt gaagtggtgg cctaactacg gctacactag 5940
aaggacagta tttggtatct gcgctctgct gaagccagtt accttcggaa aaagagttgg 6000
tagctcttga tccggcaaac aaaccaccgc tggtagcggt ggtttttttg tttgcaagca 6060
gcagattacg cgcagaaaaa aaggatctca agaagatcct ttgatctttt ctacggggtc 6120
tgacgctcag tggaacgaaa actcacgtta agggattttg gtcatgagat tatcaaaaag 6180
gatcttcacc tagatccttt taaattaaaa atgaagtttt aaatcaatct aaagtatata 6240
tgagtaaact tggtctgaca gttaccaatg cttaatcagt gaggcaccta tctcagcgat 6300
ctgtctattt cgttcatcca tagttgcctg actccccgtc gtgtagataa ctacgatacg 6360
ggagggctta ccatctggcc ccagtgctgc aatgataccg cgagacccac gctcaccggc 6420
tccagattta tcagcaataa accagccagc cggaagggcc gagcgcagaa gtggtcctgc 6480
aactttatcc gcctccatcc agtctattaa ttgttgccgg gaagctagag taagtagttc 6540
gccagttaat agtttgcgca acgttgttgc cattgctgca ggcatcgtgg tgtcacgctc 6600
gtcgtttggt atggcttcat tcagctccgg ttcccaacga tcaaggcgag ttacatgatc 6660
ccccatgttg tgcaaaaaag cggttagctc cttcggtcct ccgatcgttg tcagaagtaa 6720
gttggccgca gtgttatcac tcatggttat ggcagcactg cataattctc ttactgtcat 6780
gccatccgta agatgctttt ctgtgactgg tgagtactca accaagtcat tctgagaata 6840
gtgtatgcgg cgaccgagtt gctcttgccc ggcgtcaata cgggataata ccgcgccaca 6900
tagcagaact ttaaaagtgc tcatcattgg aaaacgttct tcggggcgaa aactctcaag 6960
gatcttaccg ctgttgagat ccagttcgat gtaacccact cgtgcaccca actgatcttc 7020
agcatctttt actttcacca gcgtttctgg gtgagcaaaa acaggaaggc aaaatgccgc 7080
aaaaaaggga ataagggcga cacggaaatg ttgaatactc atactcttcc tttttcaata 7140
ttattgaagc atttatcagg gttattgtct catgagcgga tacatatttg aatgtattta 7200
gaaaaataaa caaatagggg ttccgcgcac atttccccga aaagtgccac ctgacgtcta 7260
agaaaccatt attatcatga cattaaccta taaaaatagg cgtatcacga ggccctttcg 7320
tcttcaagaa                                                         7330
```